far into Polynesia, fading out gradually instead of stopping abruptly. Similarly the Polynesian types extend into Indonesia, ceasing gradually and not suddenly. Thus phytogeographers are given more solid reasons than ever for opposing the view of WALLACE. Starting from this sure foundation, HALLIER sets out on the perilous task of constructing land bridges between present-day islands and continents. He believes that Indonesia, Australia, and Polynesia were once connected, the islands now existing having been the mountain peaks of this former continent. In still older times HALLIER believes that Australasia and Polynesia were connected by a wide land bridge with America, the northern boundary extending through the Sandwich Islands to Lower California and the southern boundary extending from the southern islands of New Zealand, south of the Society Islands, through Easter Island and Juan Fernandez to southern Chile. HALLIER'S views recall the submerged continent postulated by DARWIN in connection with his theory of the origin of coral islands; nowadays, however, geologists seem to be getting more and more convinced of the relative permanency of oceans and continents, at least throughout the more recent ages. The possibilities of plant migration in our present world are so very large that botanists may well leave to the zoologists the construction of extensive land bridges and the arbitrary submergence and emergence of continents.—H. C. COWLES.

Evaporation and plant succession.—Among the recent contributions of quantitative data concerning the factors causing the succession of plant associations is a study by WEAVER[27] of the evaporation conditions within certain grassland and forest associations of Washington and Idaho. The succession is from the prairie to a climax forest of cedar (*Thuja plicata*), and the record extends over 126 days beginning May 7, 1912. The average daily amounts of evaporation for the various associations taken in the order of their occurrence in the succession are, approximately, bunch grass 28 cc., prairie with southwest exposures 23 cc., prairie with northeast exposure 17 cc., yellow pine (*Pinus ponderosa*) 12 cc., fir-tamarack 9 cc., and cedar forest 8 cc. These atmospheric conditions are further compared, and using those of the mesophytic cedar forest as the standard of reference, it is found that "in the fir-tamarack association from May to September, atmospheric conditions in the lower stratum are 120 per cent as severe, in the average prairie of the plains 250 per cent, and in the bunch grass association 345 per cent as unfavorable for plant life as regards the evaporating power of the air." Moreover, the conditions in the mesophytic forest are found to be almost identical to those recorded by the reviewer[28] for the climax mesophytic forest of the eastern United States as determined in

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[27] WEAVER, J. E., Evaporation and plant succession in southeastern Washington and adjacent Idaho. Plant World **17**:273–294. 1914.

[28] FULLER, G. D., Evaporation and plant succession. BOT. GAZ. **52**:193–208. 1911.

beech-maple forests of the Chicago region. Thus it is possible to make rather accurate comparisons of the conditions within the forests of the east and the west and to obtain quantitative demonstration of the equal mesophytism of the latter.

The differences in the evaporating power of the air in the different associations are found to be quite sufficient to show that this factor must be an important one in causing succession. Such accumulations of quantitative data as are contained in the present paper mark the advance of ecology along lines tending toward greater exactness, and it is to be hoped that they will become increasingly numerous.—GEO. D. FULLER.

Phylogeny of Filicales.—In continuing his studies of the Filicales, BOWER[29] has investigated *Blechnum* and its allies, and finds that the characters of the sori are of most importance in suggesting phylogenetic lines. The genus is treated in its wider sense, as comprising the subgenera *Lomaria*, *Salpichlaena*, and *Eu-Blechnum*. In *Lomaria* the indusium appears marginal, while in *Eu-Blechnum* it becomes apparently intramarginal owing to the formation of a new structure which BOWER calls the "flange." He produces evidence from a comparison of the development in numerous species that the protective organ is phyletically the same throughout the genus *Blechnum*, and he calls it the "phyletic margin." The general conclusions reached are as follows.

The *Blechnum*-like ferns and their derivatives represent a true phyletic sequence, which is traced to the region of the Cyatheaceae, the actual point of contact probably being *Matteuccia intermedia*, a fern of North China recently described by CHRISTENSEN. From this source several divergent lines have proceeded, the main line leading through § *Lomaria* to *Eu-Blechnum*, involving the origin of the "flange" and the diversion of the "phyletic margin" to indusial functions. Minor lines led to *Acrostichum*-like derivatives in *Stenochlaena* and *Brainea*. Interruption of the fusion sorus, occurring as an anomaly in *Blechnum*, led to the conditions shown in *Woodwardia* and *Doodia*. An outward arching of the fusion sorus of *Blechnum*, ultimately combined with interruption, gives the key to the origin of *Scolopendrium*. An outward swinging of the interrupted fusion sori, variously combined with archings and new formations of partial sori, and various branchings of the leaf, give the several types of *Asplenium*. The relation of *Plagiogyria* to the whole series is regarded as problematical, but it is suggested that it is an isolated and relatively primitive genus.—J. M. C.

Evolution of inflorescence.—PARKIN[30] has studied inflorescence from the evolutionary point of view, a subject which in his judgment has been "strangely

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[29] BOWER, F. O., Studies in the phylogeny of the Filicales. IV. *Blechnum* and allied genera. Ann. Botany **28**: 363–431. *pls. 22–32. figs. 26.* 1914.

[30] PARKIN, J., The evolution of the inflorescence. Jour. Linn. Soc. Bot. **42**: 511–563. 1914.